MATH 151 **QUIZ 3A** NAME Answers
Mrs. Bonny Tighe 3.3-3.5
25 points SECTION _____ Fri 2/24/06

1. Find dy/dx or f'(x).

a) $f(x) = 2x^3 - 4x + \frac{1}{x^3} + 4$ $= 2x^3 - 4x + x^{-3} + 4$

$f'(x) = 6x^2 - 4 - 3x^{-4} + 0 = 6x^2 - 4 - \frac{3}{x^4}$

b) $f(x) = 3x\sqrt{x} - \frac{1}{x^2\sqrt{x}}$ $= 3x^{3/2} - x^{-5/2}$

$f'(x) = 3\left(\frac{3}{2}\right)x^{1/2} - \left(-\frac{5}{2}\right)x^{-7/2} = \frac{9}{4}\sqrt{x} + \frac{5}{2x^{7/2}}$

c) $y = \frac{3\sec x - \sin x}{\sin x - x^3}$

$dy/dx = \frac{(\sin x - x^3)(3\sec x \tan x - \cos x) - (3\sec x - \sin x)(\cos x - 3x^2)}{(\sin x - x^3)^2}$

f) $f(x) = (3x^4 - \csc x)\left(\frac{3}{x^2} + 2x^3\right)$ $= (3x^4 - \csc x)(3x^{-2} + 2x^3)$

$f'(x) = (3x^4 - \csc x)(-6x^{-3} + 6x^2) + \left(\frac{3}{x^2} + 2x^3\right)(12x^3 + \csc x \cot x)$

$= (3x^4 - \csc x)\left(\frac{-6}{x^3} + 6x^2\right) + \left(\frac{3}{x^2} + 2x^3\right)(12x^3 + \csc x \cot x)$

$f'(x) = \cos x - \csc^2 x$

2. If $f(x) = \sin x + \cot x$, find the following:

a) $f(\pi/3) = \underline{\sqrt{3}/2 + \sqrt{3}/3}$ b) $f(-\pi/6) = \underline{-1/2 - \sqrt{3}}$ c) $f'(\pi/4) = \underline{\frac{\sqrt{2}}{2} - 2}$ d) $f'(\frac{\pi}{2}) = \underline{-1}$

a) $\sin \pi/3 + \cot \pi/3$

$\sqrt{3}/2 + \frac{1}{\sqrt{3}}$

$\sqrt{3}/2 + \sqrt{3}/3$

b) $\sin(-\pi/6) + \cot(-\pi/6)$

$-\frac{1}{2} + (-\sqrt{3})$

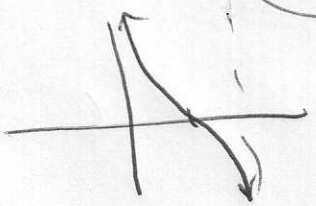
c) $\cos(\pi/4) - \csc^2 \pi/4$

$\sqrt{2}/2 - (\sqrt{2})^2$

d) $\cos \pi/2 - \csc^2 \pi/2 = 0 - (1)^2 = -1$

3. Find the limit.

a) $\lim_{x \to 0^+} (\cot x) = \underline{+\infty}$ b) $\lim_{x \to 0} \frac{\sin 4x}{x} = \underline{4}$ c) $\lim_{\alpha \to 0} \frac{1 - \cos \alpha}{\sin 3\alpha} = \underline{0}$



$\lim_{x \to 0} \frac{\sin 4x}{4x} = 1(4)$

$\frac{1 - \cos 0}{0} \cdot \frac{\infty}{\sin 3\infty}$

$0 \left(\frac{1}{1}\right) = 0$

4. Find an equation of the tangent to the curve $y = x(\sqrt{x} - 1)$ at the point (4,4).

$m = dy/dx$

$y = x^{3/2} - x$

$dy/dx = 3/2\, x^{1/2} - 1$ at $x = 4$

$\frac{3}{2}\sqrt{4} - 1 = 3 - 1 = 2$

$y - y_1 = m(x - x_1)$

$y - 4 = 2(x - 4)$

$y = 2x - 4$

5. *If* $f(3) = 2$, $g(3) = -1$, $f'(3) = 1$ *and* $g'(3) = 3$, *find the following*:

a) $(f+g)'(3) = \underline{4}$ *b)* $(fg)'(3) = \underline{5}$ *c)* $\left(\frac{g-f}{g}\right)'(3) = \underline{7}$

a) $f'(3) + g'(3)$

$1 + 3$

b) $f(3)g'(3) + g(3)f'(3)$

$2(3) + (-1)(1)$

$6 - 1$

c) $\frac{g(3)(g-f)'(3) - (g-f)(3)(g'(3))}{(g(3))^2} = \frac{-1(3-1) - (-1-2)(3)}{(-1)^2}$

$\frac{-1(2) - (-3)(3)}{1} = -2 + 9 = 7$